

the Maumelle, Magazine, and Cavanal Mountains, all of which it has been my pleasure to view and explore botanically during the past few years. The Indians and game which this famous early traveler so interestingly described are gone, and the land speculators, whom he mentions as already busy in his day, have passed also with their schemes into the limbo of the lost, although their tribe has not failed of increase. But the mountains remain in outline just as he saw them, with their flora at least intact and with their general aspect but lightly touched by the hand of time.

The hills and mountains of this part of the Ozark region are, as has been indicated, the result of the combined action of upthrow and erosion, their position and general character having been determined by lines of faulting which brought to the surface the thicker and more resistant strata. While naturally varying widely as to size and form, they may, in regard to the latter, be roughly grouped into three classes. First may be mentioned the isolated pointed or narrowly conical peaks, typically represented by the Maumelles, near Little Rock, and Pilot Knob, in Scott County, Arkansas. A second type is that of the flat-topped or table mountain, with considerable areas of comparatively level land at their summits. Magazine Mountain, in Logan County, Arkansas, is the best example of this class, and to it also belong the Short Mountains in Scott and Franklin Counties, as well as many others. The third and by far the commonest form is that of the long mountain or range with sharp or narrow keel-like summit, often extending more or less brokenly for many miles. Of this character are the Winding Stair and Kaimichi Mountains in Oklahoma, and the Poteau, Blackfork, and Rich Mountains across the boundary between that state and Arkansas. The last named, with the parallel ridge of the Blackfork, by reason of its accessibility has been more thoroughly explored botanically than most parts of this area, and since it is in many respects a typical locality, and also on account of the richness and peculiarly interesting character of its woody flora, a brief description of it will be given in this sketch.

About half way between Kansas City and its Gulf terminus at Port Arthur the Kansas City Southern railway reaches its highest level in crossing this part of the Ozarks near Eagle Gap. The elevation here is about 1750 feet (530 meters) above sea level, and from this point it begins to descend rapidly towards the Coastal plain. This north and south road, a short distance below Heavener, Oklahoma, turns sharply towards the state line, and for more than twenty miles (35 kilometers) runs nearly east and west, following a pass between the mountains, which offers the only practicable route without a wide detour or extensive tunneling. The grades here are steep in both directions, and if the traveler passes over it in daylight he has ample opportunity for viewing the general features of this interesting and picturesque part of the country. For several miles east from the village of Page, Oklahoma, the railway parallels the course of a small rocky creek, which diminishes rapidly as the ascent continues into a

rivulet, and except in rainy seasons into a dry ravine. At other times its waters may be seen dashing over the rocky bed, and occasionally spreading out into quite pools, with a border of small trees and shrubs growing amongst the masses and boulders of dark stained sandstone. The valley varies in width from a few rods to a quarter of a mile or more, and where it has not been cleared off is covered by a fine growth of Pine, Oaks, Hickories, Sweet Gum, Sugar Maple and many other trees, which will be mentioned in more detail later. Bounding the valley, and in places coming down almost to the margins of the stream, rise on both sides the steep slopes of the mountains. That on the north is Blackfork, and to the south lies Rich Mountain. The little stream between them bears the somewhat ambitious name of Big Creek, a title which would appear to be appropriate only at seasons when it carries the heavy run-off from the mountains after torrential rains. Many interesting plants, including a variety of trees and shrubs, grow along its margins, and some of them even amongst the water-worn rocks of its channel, where they are borne down and submerged by every flood.

Conspicuous amongst herbaceous plants along this rocky channel are the Willow-herb (*Dianthera americana* L.) and Letterman's Ironweed (*Vernonia Lettermanni* Engelm.). Two shrubs are also quite abundant here: the Silky Dogwood or Kinnikinnik (*Cornus obliqua*) and Ward's Willow (*Salix longipes* var. *Wardii*). This Willow, so common along many of the rocky streams of the Ozarks, sometimes becomes a small tree under favorable conditions, but here, by reason of being so frequently buffeted and broken down by the torrents, it seldom exceeds a meter or two in height and sends out many shoots from the old stumps. In foliage, too, it is rather a distinct form, perhaps worthy of segregation, the leaves being firmer and the shoots having smaller stipules than in the typical form. *Cephalanthus occidentalis*, *Alnus rugosa*, *Hamamelis vernalis*, *Callicarpa americana* and *Amorpha tennesseensis* sometimes also venture into this perilous habitat, but they are more characteristic of the rocky margins of the stream, where they are dominant species, but where their sway is also disputed by many others. Occasionally the border of the channel or deep pools is demarked by low bluffs or huge boulders where shrubby specimens of *Amelanchier canadensis* or *Acer rubrum* like to grow. More frequently there is a wide low margin of gravel or coarse rubble, amongst which sand and silt have accumulated, and since it is frequently flooded and the ground water is always near the surface here, something like bog conditions prevail. A dense growth of shrubs and herbaceous plants occupy the less exposed spots of this peculiar flood plain. The royal fern and the pretty little *Iris cristata* Ait., *Viola blanda* Willd., and many other attractive flowering plants, including several orchids, may be found in such situations. Conspicuous shrubs and small trees are *Carpinus caroliniana*, *Ostrya virginiana*, *Cercis canadensis*, *Rhus Toxicodendron*, *Vaccinium stamineum*, *Xolisma ligustrina*, *Rhododendron roseum*, *R.*

oblongifolium, *Hypericum prolificum* and *Callicarpa americana*, and occasional specimens of *Quercus Phellos* and *Ilex opaca*, and in great abundance the woody vines, *Berchemia scandens* and *Vitis rotundifolia*.

In places where the rocky surface of the valley is slightly more elevated and consequently drier, other species are dominant. By reason of the sterile surface and frequent floods, most of the arborescent species attain only the size of shrubs, and the thicket formation continues. Here are found occasional Oaks and Hickories of several species, Winged Elm, Southern Hackberry (*Celtis laevigata*), Sycamore, Sweet Gum, Black Gum, Flowering Dogwood, Smooth and Copal Sumac, Fringe-tree or Old man's beard (*Chionanthus virginica*), Wafer Ash (*Ptelea trifoliata*), Gum-elastic Tree (*Bumelia lanuginosa*), *Crataegus spathulata* and the Saw Briar (*Smilax Bona-nox*). Other parts of the valley, above ordinary floods, and where the surface is covered with a fertile sandy loam, support a fine forest growth, in which several of the above species, growing to a larger size, are mingled with many others. Amongst the more important trees of this section are the Yellow Pine (*Pinus echinata*), Mocker-nut and Arkansas Hickories, White, Black, Spanish and Post Oaks, Sweet and Black Gum, Southern Linden (*Tilia floridana*), and Sugar Maple. Additional undershrubs of frequent occurrence are Spice-bush, Sassafras, Parsley-leaved Haw (*Crataegus apiifolia*) and Papaw. A few specimens of Beech were seen along the margins of the creek, but this tree is nowhere common in the locality, and has not been noted farther north. Along the upper part of the stream the Cucumber Tree (*Magnolia acuminata*) appears, and it becomes commoner as the divide is approached. It is not found in the lower part of the valley, but grows commonly on the north sides of the mountains, where it attains a much larger size. One other interesting shrub should be mentioned before leaving the valley. This is the northern Leatherwood (*Dirca palustris*), which was found growing along the creek margins at the base of a small rocky bluff.

Many of the trees and shrubs of the valley continue for a little distance up the mountain slopes, but as conditions change a large proportion of them disappear and give place to others. There is a marked difference in the character of the forest growth on the north and south slopes. This can be distinctly observed in a general way even by the traveler as he passes through the valley on the not too swiftly moving trains. As the village of Page is approached from the west, Blackfork Mountain looms up ahead like a great pyramid. It is in fact the end of a long sharp ridge which extends eastward for about 15 miles (25 kilometers) to Eagle Gap, and thence, more or less interruptedly for a greater distance in the same general direction, under the name of Fourche Mountain. For much of the distance the crest of the range rises 1000 to 1250 feet (300 to 380 meters) above the valley. Observing this slope from the train window, as it passes in panorama on the left, a thin covering of timber will be seen extending quite to the top, but in places there are spots devoid of trees,

and where the gray rock covers the surface. The forest consists of a mingled growth of pine and broad-leaved trees, the former standing out distinctly, on account of their greater height and dark foliage, from the more abundant Oaks, Hickories and a few other deciduous trees mingled with them. Turning to the other side, the north slope of Rich Mountain is in sight. This range begins several miles farther west in Oklahoma and parallels the Blackfork to the gap, where it bends sharply to the south and ends in a fish-hook-like curve, a part of which is locally known as Mount Mena, from the town of the same name in Arkansas. The western part of Rich Mountain somewhat exceeds in height the crest of Blackfork, and at its loftiest point, about eight miles west of the Arkansas-Oklahoma state line, it reaches the altitude of over 2850 feet (835 meters) above sea level at the Gulf of Mexico. And since this exceeds by a few feet the summit of Magazine Mountain in Arkansas, it has the distinction of being the highest point in the Ozark region. The forest growth on the north slope is not only denser than that of the south exposures, but it consists almost exclusively of deciduous trees, many of which attain a large size, and as we shall see on closer inspection, the composition is different and much richer in species.

As the south side of Blackfork Mountain is most accessible and has in consequence been more thoroughly explored than that of the opposite range, a brief description of this will be given. That quite similar conditions prevail on the corresponding side of Rich Mountain was indicated by casual inspection at several points.

The slope on these south exposures is steep and rather uniform in most places from base to summit. There are occasional outstanding ledges with vertical faces, but these are generally only a few feet in height, and the angle usually does not exceed twenty or thirty degrees. The rock formation seen on the surface consists almost exclusively of a rather dense finely grained sandstone, of light buff color on fresh fracture, but weathering to a dull gray, a color effect which is also enhanced by the covering of lichens on long exposed surfaces. In places the slope is covered with loose angular fragments of this stone, ranging in size from hand specimens to masses weighing several tons. These boulders piled upon each other at all angles over many rods of the surface, as is often the case, present a very curious appearance. They bear some resemblance to the coarser material left by terminal moraines in the glaciated regions. Or perhaps they might better be compared to the packs of ice blocks that accumulate in some northern rivers after the break up of the winter accumulation. They probably owe their origin to the breaking down of layers of the heavily bedded sandstone alternating with shale, which were tilted at a high angle in the opposite direction to the slope of the mountain side. As the softer shale weathered out more rapidly it left the layers of sandstone standing as a hanging wall, which under the combined effect of gravity and erosion kept breaking off and shifting and sliding down the

slope, until the accumulation from different levels completely covered up the ledges and serve to protect them from further disintegration. The surface of these rock slides is often almost entirely barren of vegetation. A few herbs and shrubs, however, sometimes find foothold amongst the clefts. The little fern, *Polypodium polypodioides* Hitchc., frequently grows on the north faces of large boulders amongst the lichens and mosses. Stunted trees and shrubs cling to the margins and occasionally appear in spots where there is a little accumulation of finer material. *Quercus marilandica*, *Crataegus spathulata* and *Castanea ozarkensis* are frequently found in such situations. Over the greater portion of the mountain side, where the slope is not too steep for the accumulation of some soil, is found a rather open forest, in which the Pine (*Pinus echinata*) attains the largest size and generally far overtops the deciduous trees. Amongst the commonest species of the latter class here are *Carya alba*, *C. Buckleyi* var. *arkansana*, *Quercus alba*, *Q. stellata*, *Q. velutina*, *Q. marilandica*, *Q. borealis* var. *maxima* and *Robinia Pseudoacacia*. Smaller trees and shrubs growing here are *Ostrya virginiana*, *Ulmus alata*, *Celtis pumila* var. *georgiana*, *Sassafras officinalis*, *Quercus Muhlenbergii*, *Crataegus apiifolia*, *C. pagensis*, *Rubus Andrewsianus*, *Rhus Toxicodendron*, *Acer rubrum*, *Cornus florida*, *Vaccinium arboreum*, *V. stamineum*, *Bumelia lanuginosa* and *Viburnum rufidulum*. Where the slope is somewhat steeper, or where for some other reason the forest has not been able to take possession, there are thickets composed largely of shrubs and a few herbaceous species. These give place in spots to open rocky glades, where the flora is of a more xerophytic character, and to small areas where there is scarcely any ligneous growth, and upon which a grassy prairie flora prevails. The low and high Bush Huckleberries (*Vaccinium vacillans* var. *crinitum* and *V. stamineum*) abound in these thickets, as well as small specimens of the Tree Huckleberry (*V. arboreum*). Often also there are stunted specimens of the Black Locust, Blackjack, Post Oak, and small Plum and Haw bushes of several species. *Amorpha glabra* frequently grows here and in the edges of the glades, where it becomes a tall shrub from one to two meters in height. Amongst the rocks, where it has few competitors except the low Huckleberry, there are often large colonies of little spiny Rose (*Rosa subserrulata*). *Yucca glauca* is sometimes found in the glades, with *Agave virginica* L., *Opuntia humifusa*, *Hypericum cistifolium* and other plants of similar habitat. Here also was first noticed an unknown species of St. John's-wort, which is described in another part of this paper as *Hypericum oklahomense*. On the open rocky slopes and in the glades it is a low branching shrub, usually under half a meter in height, but in more favorable situations it becomes much taller.

Well up towards the top of the mountain and on its level summit the prairie openings are best developed. Such grasses as species of *Andropogon*, *Sporobolus* and *Sorghastrum* flourish here. There are scarcely any woody plants, except for a few low Huckleberry bushes and occasionally the little

St. Andrew's Cross (*Ascyrum hypericoides*) and the St. John's-wort referred to above. But there are a number of conspicuous flowering herbs, including *Viola pedata* L., *Kneiffia linifolia* Spach, and at a later season various species of *Aster*, *Solidago* and *Lespedeza*.

At the summit of the mountain, in a number of places, great masses of the heavily bedded hard sandstone stand out, tilted at high angles or sometimes almost perpendicular. The northern Red Oak (*Quercus borealis* var. *maxima*) grows frequently about these rocky ledges and on the steeper slopes near the top of the mountain. The Red Cedar (*Juniperus virginiana*) also occasionally occurs here, but is nowhere frequent. Wild animal life, formerly without doubt very abundant, seems singularly scarce, considering the apparently favorable environment. Besides insects, only a few lizards and snakes and a surprisingly small number of birds were seen. Amongst the last was a single wild turkey flushed from a thicket near the top towards the western end of the mountain.

In approaching the north side of Rich Mountain in the lower part of the valley, below the village of Page, which was the point from which most of our exploring trips started, a mile or two of comparatively level but broken ground must be traveled before the real climb begins. The surface here is rocky, much of it covered with loose rubble and cut up with small ravines. As it is also covered for the most part with a dense growth of small trees, shrubs and tangled vines, traveling, in the absence of a road or trail, is most difficult. Roads have been roughly cleared at intervals to bring logs down from the mountain side to the saw mills formerly operated at Page, and in a few places there are trails leading to the top. But if the explorer is more intent upon making discoveries than upon speed or comfort, he will not follow these far, but will strike out up one of the numerous deep ravines which scar the mountain side. For here will be found not only the most picturesque scenery but also the greatest abundance and variety of plant life. After heavy rainfalls great volumes of water rush down these channels, and in several of the deeper ones are the sources of small creeks, fed by perennial springs. At most seasons one may climb far without seeing a trace of running water, but upon scaling some ledge he will come upon a strong flowing stream dashing over moss covered rocks and ledges, with many miniature cascades and limpid pools, their margins and the rocky banks covered with a luxuriant growth of ferns, flowering herbs and shrubs. The Christmas Fern, Maidenhair Fern and Marginal Shield Fern are abundant here, and the wild Hydrangea (*Hydrangea arborescens*), Mockorange (*Philadelphus pubescens*), *Ilex caroliniana*, and sometimes the slender Strawberry-bush (*Evonymus americanus*), bent down in autumn with its load of beautiful carmine and orange fruit, grow pendent over the rocky ledges. Red and Sugar Maple, Chinquapin, Linden and several sorts of Hickories and Oaks grow along the margins and interlock their branches above the narrow channel. A little farther up the slope, if the season is early spring, may be seen a

gorgeous display of the blossoms of the Pink Azalea (*Rhododendron roseum*), its clusters of showy flowers terminating the still naked branches. The Flowering Dogwood and Juneberry (*Amelanchier canadensis*) also display their blossoms through the leafless woods at this time. A little later, in the same environment, bloom the Cucumber-tree (*Magnolia acuminata*), Chinquapin and Linden, the last, with the wild Grapes and the yellow-flowered Honeysuckle (*Lonicera flava*), filling the air with fragrance. Here and on the intervening slopes at these half way levels, grow many fine specimens of White and Black Oak, Linden, Black Gum and several kinds of Hickory, one of which may belong to an undescribed species.

Climbing laboriously a little farther over slippery ledges, tangled shrubbery and fallen logs, we may emerge upon one of the curious rubble fields or rock slides, similar to those described on the south slopes of Blackfork Mountain. But on this side they are usually of smaller extent and confined to the vicinity of the eroded stream channels. The rocks here are not quite so barren and destitute of plant life as on the south slopes. Near the margins and at intervals amongst the rocks numerous plants, including several shrubs and small trees have taken possession. A tall white-flowered Composite (*Polymnia canadensis* L.) is common, and vines of the Grape (*Vitis cordifolia*) trail over the rocks or climb over low bushes of Hydrangea, Bladdernut (*Staphylea trifolia*) and the prickly-fruited Gooseberry (*Ribes Cynosbati*). The last is very frequent and grows to a large size, some of the hispid canes being two or three meters in length and twenty to twenty-five millimeters in diameter. It was a great surprise to find this northern species growing here, and the curious way in which it has adapted itself to this unusual environment is no less interesting. There is little soil amongst the large sandstone blocks, but such as there is consists of leaf humus added to the sand from their disintegrating surfaces, and many of the rocks are moss grown and moist for a large part of the season. During rainy periods the waters, which emerge in the stream farther down, may be heard rushing and rumbling, probably several meters below, and the roots of these shrubs undoubtedly find their way amongst the crevices of the rocks to this water supply. Clambering slowly over these boulders, which is not without danger, especially in wet weather, when they are slippery and treacherous and a misstep might result in a broken limb, we may shortly come to a comparatively level bench, perhaps thirty or forty meters in depth, bounded by rocky ledges or a steep bank above, and partially enclosed on the sides, thus forming a small cove open to the north or lower slope of the mountain. Deposits of soil have accumulated here, washed down from the higher levels, and it has also been enriched with leaf mould of ages from the deciduous forest. By reason of the fertility of this soil, the more constant supply of moisture and protection afforded from the hot dry winds of summer, these coves support a particularly luxuriant and interesting flora. Here, in addition to many of the trees and shrubs previously mentioned, are found fine specimens of

the Black Walnut, Sugar Maple, White Ash and rarely the Umbrella-tree (*Magnolia tripetala*). Growing as a second layer or in the more open spots are the Papaw, Spicebush, Bladdernut, Southern Witch-hazel (*Hamelis macrophylla*), Tear-blanket (*Aralia spinosa*) and Silverbell-tree (*Halesia monticola* var. *vestita*). Some of the Walnut trees attain a large size, having long escaped the woodman's axe by reason of their inaccessible situation. A few years ago a rough road was constructed more than half way up the mountain side, to bring down logs of this valuable timber. At the time of one of my visits a large pile of them was awaiting shipment near the railway, some specimens measuring nearly a meter in diameter.

The Silverbell-tree of these mountains is a species of the southern Alleghenies, having previously been known west of the Mississippi river at only one other station in the Boston Mountains. It is found in considerable abundance in some of the coves, and more rarely on the adjacent slopes and ledges. As it grows here it is usually a shrub three to five meters in height, but rarely it attains the size of a small tree. The largest specimen observed was perhaps seven or eight meters tall, and with a trunk two decimeters in diameter. The bark, except on the oldest specimens, is of a reddish-gray or chestnut color, variegated with pale streaks and lenticles, and somewhat resembling that of the Striped Maple. The flowers open while still quite immature and green, a peculiarity that has been noted in *Halesia carolina* L. by Dr. R. M. Harper. Before falling they are more than double in size, the corollas becoming two centimeters or more in diameter, and of a pale cream color slightly flushed with pink.

Through lack of time and the necessity of limiting the impedimenta on these hard climbs, very few of the herbaceous plants were collected, and no general list was made. This part of the vegetation, however, is very luxuriant in the north facing coves, perhaps even more remarkable than the woody plants, and certainly with more northern species, uncommon in this part of the country. In the richer spots there are great beds of the Maidenhair-fern, Beech-fern and Christmas-fern, besides more rarely the Fragile Fern, Rattlesnake-fern and others. Bloodroot, Dutchman's-breeches, Wild Ginger, Wake-robin, Bellwort, March-lily (*Erythronium americanum*), Spider-wort and Violets, yellow and blue, are amongst the common spring flowers. Here also, as the season advances, are found the blue Cohosh, Black Snakeroot and White-fruited Actea, and scores of other plants of similar association. But we must hasten on, as it is still some distance to the top of the mountain.

A little farther up we begin to encounter, on the rich open slopes, the little Buckeye (*Aesculus glabra* var. *monticola*), which we may find even more abundant on top of the mountain. Many of the plants here are not more than half a meter in height, and the large cymes of creamy-yellow flowers in spring, and the heavy clusters of fruit in autumn, sometimes bear down the slender branches. The pretty little yellow-flowered Honeysuckle (*Lonicera flava*) and the Wild Yam (*Dioscorea villosa*) are

frequently found in similar situations, and a southern Gooseberry (*Ribes curvatum*) grows sparingly along rocky ledges.

As we approach the top the trees begin to diminish in size; the woods become more open and the herbaceous growth is sparser. Upon attaining the summit we find ourselves on a strip of comparatively level rocky ground, which may be followed for several miles east or west, but which often is not more than a hundred yards in width, and sometimes narrowing to a sharp rocky ridge or widening to several times its average breadth. Much of the surface is strewn with sandstone rubble and boulders of disintegration. On the more level portions there is sometimes a considerable accumulation of sandy soil, and small areas might even be tillable. Over most of this portion there is a growth of small timber, White Oak being the commonest, and in spots almost the only species. The trees are small, seldom more than eight or ten meters tall, and with gnarled and twisted trunks and branches, evidence of their struggle with the strong winds that at most seasons sweep across these heights. Other species of less common occurrence are the Blackjack, Black and Post Oaks, Mocker-nut and Arkansas Hickories, Chinquapin (*Castanea ozarkensis*), Sassafras, White Ash, Big-tree Plum (*Prunus mexicana*), Flowering Dogwood, Persimmon and a few others. Towards the east end of the mountain, in Arkansas, the Cucumber-tree is sometimes found in this summit forest, and the Chinquapin is more abundant. In the more rocky portions the trees give place to copse or thicket growth, in which shrubs and several of the arborescent species mentioned above, but attaining only the size of low shrubs, abound. Here are found several species of Plum and Haw bushes, Wafer Ash, Fringe-tree or Old man's beard (*Chionanthus virginica*), Witch-hazel, Blackberries, Buckeye (*Aesculus glabra* var. *monticola*), Copal Sumac and Carolina Ilex. Occasionally there is a stunted Pine or Cedar bush, and about rocky ledges grow the Juneberry (*Amelanchier canadensis*), Gum-elastic (*Bumelia lanuginosa*) and two shrubby species of St. John's-wort (*Hypericum prolificum* and *H. oklahomense*). The latter is much the commoner, and is very abundant in some spots. The bushes sometimes reach a height of two meters, with stout spreading branches. Some of the stems near the base are more than two centimeters in diameter, with shredded or thinly exfoliating bark. Prairie openings and glades, similar to those mentioned as occurring on Blackfork Mountain, occupy small areas in the more sterile portions, especially towards the south side. The grasses and small flowering plants of these open spaces belong for the most part to common and widely distributed species, characteristic of the adjacent western prairies.

At an early season a very distinct contrast is noticeable in the vernal response of the vegetation in the valley and at the top of the mountains. This is quite out of proportion to the difference in altitude, which generally is less than 1600 feet (about 500 meters). There is also a distinctly slower development of verdure on the south than on the north side, towards the

top of the mountain, while the contrary is true at the lower levels. This is doubtless to be accounted for by the strong, and at this season cold, south winds that prevail at the higher level on the windward side, and conversely to the protection afforded against them by the position of the valley, and by its somewhat higher humidity. This contrast in the relative advancement of vegetation at the different levels was most noticeable when an ascent of the mountain was made from Page, on April 12th, 1922, the season being a rather backward one. At this time nearly all trees and shrubs in the valley were in full leaf; Oaks and Hickories were dropping their staminate flowers; all of the *Vacciniums*, Black Haw and most species of *Crataegus* were in bloom; while such early things as Plums, Redbud, Sassafras and Juneberry were past flowering. Half way up the north side of Rich Mountain the Oak and Hickory leaves were less than half grown; Linden and Sweet Gum were just beginning to leaf out, Dogwoods and Silverbell-trees were blooming in the coves. A little farther up the small green flowers of the last named tree were just appearing; and the little Buckeye and Pink Azalea were in full bloom. On top of the mountain, Buckeye, Sassafras, Juneberry and Plums were in bud or just beginning to bloom, while many of the other shrubs and trees were still quite dormant.

During rainy seasons, especially in the autumn, fogs often prevail on the mountain top or sometimes settle in the valleys, while at the same time the sun may be shining on the lower or higher levels. At such times vegetation becomes thoroughly saturated and drips with moisture although no rain may fall, and since one can see but a very short distance, to be caught on the rough mountain side, as happened on one of my trips, is to say the least not a pleasant experience. When the atmosphere is clear wonderful views of the surrounding country may be had from some of the highest points on Rich Mountain, particularly towards the south where there is little timber on the summit to obstruct the outlook. Range upon range of wooded mountains are in sight, with occasional small valleys intervening, in which clearings and settlements stand out in sharp contrast, and beyond, the blue outlines of the hills merge into each other until lost on the far horizon. Some attempts at settlement have been made on the mountain top, especially towards the eastern end. A small tourist hotel was built above the station of Rich Mountain, Arkansas, several years ago, but it is not now in operation, and is in a state of dilapidation. There are also a few other, mostly abandoned, buildings in the same vicinity, and an occasional woodman's cabin may be found elsewhere. But so well has nature held her own here that in most parts one may tramp all day without meeting a soul, seeing any stock or encountering any other sign of human occupancy.

The following list of woody plants is compiled from collections made on several trips at different seasons from Page, Oklahoma, and one in the autumn of 1923 from Rich Mountain Station, Arkansas.

PINACEAE

Pinus echinata Mill. Growing in mixed stands with Oaks, Hickories and other broad leaved trees in the valley and on the south slopes of the mountains. It is most abundant on the south side of Blackfork Mountain, where it extends to the top and in many places constitutes the major part of the forest. After being cut for several years to supply the saw mills in the valley this species is still conspicuous, and in inaccessible places some fine specimens remain.

Juniperus virginiana L. Found occasionally at all levels from the valley to the mountain tops, but nowhere very abundant or of large size.

LILIACEAE

Yucca glauca Nutt. This low species, with only a woody base, is found sparingly in the rocky valley of Big Creek, but is more abundant in open situations on the south slopes of the mountains.

Smilax Bona-nox L. This is the common Sawbriar of the region, and is particularly abundant in the thickets in the rocky valley, where it is a great hindrance to the pedestrian.

Smilax hispida Muhl. In thickets and low ground in the valley and on the lower mountain slopes.

Smilax rotundifolia L. This southern species was noted only in the valley where it seeks the richest and dampest locations.

Smilax glauca Walt. Uncommon in thickets and open ground both in the valley and on top of the mountains.

SALICACEAE

Populus balsamifera var. *virginiana* (Castigl.) Sarg. A few trees were noted along Big Creek in the lower part of the valley, but it is uncommon here and not found above Page.

Salix longipes var. *Wardii* (Bebb) Schneider. This Willow is abundant in the valley, growing along the margins or amongst the rocks in the shallow channel of Big Creek, where it is a shrub seldom more than two meters in height. It is rarely found about pools in the channels of the small streams on the north side of Rich Mountain.

Salix nigra Marsh. A few small specimens were seen in the valley near Page, but it is quite rare and apparently absent above this point.

JUGLANDACEAE

Juglans nigra L. Rarely found in the valley, but often abundant and of large size in the coves and on rich slopes on the north side of the mountain.

Carya cordiformis (Wang.) K. Koch. Not infrequent along creek banks in the valley and on the north slopes of the mountain.

Carya cordiformis var. *latifolia* Sarg. Occasionally found with the type, and in similar situations.

Carya ovalis var. *obovalis* Sarg. This form is rare, if found at all in the valley, but is more abundant on the north slopes of the mountain.

Carya Buckleyi var. *arkansana* Sarg. This species is the commonest Hickory of the valley and lower mountain slopes, but is less abundant at higher levels.

Carya alba (L.) K. Koch. A common species both in the rocky valley and on both sides of the mountains, extending to the top, where it is not infrequent but of smaller size.

Carya alba var. *ficoides* Sarg. It is interesting to find this form, with its very distinct fruit, not infrequent on the north slopes of Rich Mountain. It was originally described from a single tree in Southwest Missouri, but since has turned up in several other widely scattered stations.

BETULACEAE

Betula nigra L. The River Birch grows sparingly along the margins of Big Creek.

Carpinus caroliniana Walt. This species is confined to the valley and lower slopes, and is most frequent along the rocky banks of the creek.

Ostrya virginiana (Mill.) K. Koch. A common small tree in the rocky valley, and more or less abundant on the slopes and top of the mountain.

Alnus rugosa (DuRoi) Spreng. A common shrub along the rocky banks and bed of Big Creek, and sometimes found along its small tributaries as they descend into the valley.

FAGACEAE

Castanea ozarkensis Ashe. The Chinquapin of the Ozark region, which has recently been described under this name, appears to be sufficiently distinct from the eastern and southern *Castanea pumila*, with which it has long been confused. However, there is much variability in the size and tothing of the leaves, as well as in their pubescence, and in the size and shape of the nuts, and I can see no justification for distinguishing in this region, as the author has done, a second species (*Castanea arkansana* Ashe) with densely prickly involucres. This species is not rare on both slopes and on top of the mountains. Here, as elsewhere, it grows usually as a large arborescent shrub, but occasionally as a tree with a single trunk and with a maximum height of eight or ten meters.

Castanea Margaretta Ashe. On top of Rich Mountain, above the station of the same name, in Arkansas, a Chinquapin was collected in fruit, having involucreal spines sparse and remotely set, and appearing to agree generally with description of this species, to which it is rather doubtfully referred, as I know little of it.

Fagus grandifolia var. *caroliniana* (Loud.) Fernald & Rehder. A few trees of this Beech were found along the creek a short distance east of Page. It was not noted elsewhere on the mountain slopes in Oklahoma but is not rare in the vicinity of Mena, Arkansas.

Quercus alba L. The White Oak is a common tree throughout. Some magnificent specimens, with trunks a meter or more in diameter, and attaining a height of 25 or 30 meters, may still be seen in inaccessible places on the north slopes of Rich Mountain. On top of the mountain it is the most abundant arborescent species, but attaining only a small size. The variety *latiloba* Sarg. grows with the typical form.

Quercus stellata Wang. The Post Oak is very common in the rocky valley, and is found in open places on the slopes and abundantly on top of the mountains.

Quercus stellata var. *araneosa* Sarg. In sandy soil in the valley of Big Creek. Apparently rare.

Quercus stellata var. *Margaretta* (Ashe) Sarg. Found rarely in the valley near Page.

Quercus Muhlenbergii Engelm. The Chinquapin Oak is found rather sparingly both in the valley and on the slopes and tops of the mountains.

Quercus Phellos L. A few small specimens of the Willow Oak were found along Big Creek, near Page. Its presence here indicates its greater adaptability than its congener, *Q. nigra*, both species being equally common in the lowlands of the larger streams of the vicinity.

Quercus borealis var. *maxima* Ashe. The northern Red Oak is of rather frequent occurrence on the steep rocky slopes on both sides of the mountains, but is apparently rare or absent in the valley and on the tableland of Rich Mountain.

Quercus Shumardii var. *Schneckii* (Britton) Sarg. This species is found both in the valley and on the north mountain slopes. In the latter situation it often becomes a fine large tree.

Quercus rubra L. This species—the Spanish Oak of the books—but usually called Red Oak in the South, is abundant in the valley but is not often found at the higher levels.

Quercus velutina Lam. The Black Oak is common both in the rocky valley and on the slopes and tops of the mountains.

Quercus velutina var. *missouriensis* Sarg. This rather well marked variety, with its less deeply cut and permanently pubescent leaves, is sometimes found here, growing with the typical form.

× *Quercus heterophylla* Michx. (*Q. borealis maxima* × *Phellos*). A hybrid apparently between these species was found in the valley near Page, and close to Big Creek. Both of the supposed parent species are growing in close proximity to it, and since *Q. Phellos* is rare, it is not surprising that it should have been cross pollinized by another species. From the narrow and variable character of the leaves it is evident that the Willow Oak is one parent, and the Red Oak is suggested by the texture and lack of pubescens in the foliage and by the character of buds and branchlets, as well as by its proximity. Although of adult size there was no fruit when the specimens were collected.

ULMACEAE

Ulmus americana L. Found in the valley and more rarely along ravines and ledges on the mountains, but nowhere common.

Ulmus fulva Michx. Comparatively rare on bluffs and steep slopes.

Ulmus alata Michx. This is the commonest elm of the area, and is found both in the valley and on the mountain tops and more rarely on the slopes.

Celtis laevigata Willd. Rarely found in the valley along Big Creek.

Celtis laevigata var. *texana* (Scheele) Sarg. A few specimens of this southwestern form were seen in the valley near Page.

Celtis pumila Pursh. This shrubby species is occasionally found on exposed slopes and ledges on the south side of the mountains.

Celtis pumila var. *georgiana* (Small) Sarg. This form, with pubescent leaves and branchlets, grows in similar situations to the last. It is here a slender straggling shrub, seldom more than one to two meters tall.

MORACEAE

Morus rubra L. The Mulberry is found sparingly in the rocky valley and on the lower slopes of the mountains. It was not noted on top, although it may perhaps occur there.

LORANTHACEAE

Phoradendron flavescens (Pursh) Nutt. Confined to the valley and lower slopes, where it grows on *Ulmus*, *Quercus*, *Nyssa* and perhaps other genera.

MENISPERMACEAE

Menispermum canadense L. Found in thickets in the valley and in coves on the north side of the mountain, but nowhere abundant.

Cocculus carolinus (L.) DC. Sometimes frequent in thickets in the valley.

MAGNOLIACEAE

Magnolia acuminata L. The Cucumber tree is found along the rocky banks of Big Creek in the upper part of the valley. On the Arkansas side, it extends to the top of Rich Mountain. Farther west, in Oklahoma, it is confined to the steep north slopes of the mountain, but there it is often abundant and of maximum size.

Magnolia tripetala L. The Umbrella tree was observed only towards the east end of Rich Mountain, in Arkansas, where it grows in coves and on rich north slopes. It is not improbable that it may occur somewhere on the Oklahoma side of the line, although we have no record of it. Specimens distributed under this name by G. W. Stevens, from Page, Oklahoma, which I have examined in several herbaria, are all of the preceding species.

ANONACEAE

Asimina triloba (L.) Dunal. The Papaw is found occasionally in the valley and more abundantly in the north facing coves of the mountain side.

LAURACEAE

Sassafras officinale Nees & Eberm. This is an abundant shrub or small tree in the valley, and is even more frequent on the table land at the top of Rich Mountain.

Benzoin aestivale (L.) Nees. The Spicebush grows as an undershrub in the rich woods of the valley, and extends to the top of the mountain, but it is most abundant in coves on the north slopes.

SAXIFRAGACEAE

Hydrangea arborescens L. This shrub is found on cool shaded banks at all levels, but is most abundant along the rocky ravines and in the rich coves on the north side of Rich Mountain.

Philadelphus pubescens Loisel. This handsome shrub grows only along rocky ravines and benches well up on the north slopes of the mountain, but in such situations it is often abundant.

Philadelphus pubescens var. *intectus* (Beadle) Rehd. This variety, distinguished by its glabrous or only slightly pubescent leaves, is found here with the typical form, but is less abundant.

Ribes Cynosbati L. This prickly-fruited northern Gooseberry is also confined to the higher slopes on the north side of the mountain. It is sometimes found on rocky ledges, but is most frequent on the great rubble heaps or rock slides that form such a curious feature of the mountain side.

Ribes curvatum Small. This low southern species grows sparingly along ledges near the top of Rich Mountain.

HAMAMELIDACEAE

Hamamelis macrophylla Pursh. This southern Witchhazel grows both in the valley and on the north slopes and top of Rich Mountain. In protected situations, especially at the lower altitude, it becomes a large shrub, sometimes four or five meters tall and with stems fully a decimeter in diameter. Higher up it often grows in great patches, most of the plants being under half a meter in height.

Hamamelis vernalis Sarg. The spring blooming species of the Ozarks is found along the rocky banks and bed of Big Creek.

Liquidambar styraciflua L. The Sweet Gum is a common forest tree in the valley. It also grows on the north slopes, where it attains a very large size.

PLATANACEAE

Platanus occidentalis L. Only a few specimens of the Sycamore were seen along Big Creek, in the lower part of the valley.

Platanus occidentalis var. *glabrata* (Fernald) Sarg. This variety, with the leaves early glabrate and with its lobes entire, was collected on the rocky banks of Big Creek a short distance below Page.

ROSACEAE

Amelanchier canadensis L. The Juneberry is found on open rocky ledges from the valley to the top of the mountain. It is usually shrubby, seldom exceeding two or three meters in height.

Crataegus Bushii Sarg. A small tree occasionally found in thickets and open woods in the valley.

Crataegus bracteata Sarg. This species, of the Pruinosa group, was collected and observed in several places on top of Rich Mountain.

Crataegus spathulata Michx. This southern Red Haw is frequent in the rocky valley and on the south slopes of Blackfork Mountain. It is of small size here, rarely exceeding two or three meters in height.

Crataegus apiifolia Michx. The Parsley-leaved Haw, also a southern species of the Microcarpae group, grows in similar situations to the last. It is even more abundant than its congener on the open rocky slopes of the mountains, where it is usually a low bush not more than a meter or two in height.

Crataegus pagensis Sarg. The type locality for this shrubby species is, as the name indicates, near Page. It is rather abundant in the rocky valley and on the lower slopes on the south side of Blackfork Mountain. It is a very spiny intricately branched shrub, from one to two meters in height. The flowers are large and handsome.

Crataegus straminea Beadle. This species grows in similar situations to the last and is about as common. Although of similar habit and belonging to the same group, the two are quite distinct in character of fruit, flowers and leaves.

There are perhaps two or three other species of *Crataegus* growing here, although the genus is not abundantly represented.

Prunus serotina Ehrh. The wild cherry is not uncommon both in the valley and on the mountain sides.

Prunus Munsoniana Wight & Hedrick. Occasionally found in thickets in the valley and on top of the mountain.

Prunus lanata (Sudworth) Mackenzie & Bush. A small tree plum of the American group, with pubescent leaves, has been referred to this species, although it is probably distinct from the type described from western Missouri. Frequent in thickets in the valley and in open ground on top of Rich Mountain.

Prunus mexicana Wats. This is here a small tree growing in similar situations to the last species, which it somewhat resembles. The leaves, however, of this southwestern species are generally larger and more rugosely veined than in any other American plum.

Rubus occidentalis L. The wild Raspberry grows in thickets and on rocky ledges on the north side of the mountain.

Rubus flagillaris var. *invisus* Bailey. This Dewberry is common in rocky ground, both in the valley and on the mountain slopes.

Rubus frondosus Bigel. Found in thickets in the valley and on the north side of the mountain.

Rubus Andrewsianus Blanchard. This Blackberry, with upright or slightly arched stout canes, is very abundant in thickets in the valley and on the tableland at the top of Rich Mountain.

There is evidence of at least two other species of *Rubus* in this locality, one of them resembling *Rubus canadensis* L., and perhaps referable to that species, but with the incomplete material available I am unable to identify them definitely.

Rosa setigera var. *tomentosa* Torr. & Gray. Found in thickets and open places in the valley, but not common.

Rosa subserrulata Rydb. This little Rose is common throughout much of the Ozark region. In this locality it is sometimes found in the valley, but is much more common on the rocky mountain sides and on top, where it sometimes grows in patches covering many square meters. The plants are usually low, often not more than two or three decimeters in height, although in protected situations they are sometimes nearly a meter tall. With its hispid prickly stems, sharply serrate leaves and somewhat glandular foliage and inflorescence, it is an easily recognizable and well marked species.

LEGUMINOSAE

Gleditsia triacanthos L. The Honey-locust is sometimes found in the valley, but it is not common.

Cercis canadensis L. The Redbud is a common small tree found in the valley and on top of the mountains, and less frequently in open places on the rocky slopes.

Robinia Pseudoacacia L. The Black Locust is a common species on the rocky slopes of the mountains on both sides of the valley, and it sometimes descends to the rocky creek banks. It is undoubtedly native on these mountains and through much of the southern Ozark region.

Amorpha fruticosa L. This shrub was noted only along the margins of Big Creek and its tributaries in the valley.

Amorpha tennesseensis Shuttlw. This species, which closely resembles the last, grows in similar situations.

Amorpha glabra Desf. Sometimes found in the rocky valley, but much more common in glades and open rocky places on the south slopes of Blackfork Mountain. It is a tree-like shrub, sometimes more than two meters tall.

RUTACEAE

Ptelea trifoliata L. Found in rocky thickets in the valley, but most abundant on the mountain tops.

ANACARDIACEAE

Rhus canadensis Marsh. The Aromatic Sumac is found in thickets and open rocky ground from the valley to the summits of the mountains.

Rhus trilobata Nutt. This taller and much stouter species grows in thickets and on rocky ledges. It is most abundant on the tableland at the mountain top.

Rhus Toxicodendron L. The Poison Ivy is a common shrub or climber in thickets and open woods at all levels. There are evidently two, and perhaps three, forms or varieties, which have not been distinguished, growing here. There is marked variation in the size, lobing and pubescens of the leaves, in the upright or scandent habit, and in the time of flowering.

Rhus glabra L. The Smooth Sumac is found in thickets both in the valley and at the top of the mountains.

Rhus copallina L. This species grows in similar situations to the last, and is more common.

AQUIFOLIACEAE

Ilex opaca Ait. The evergreen Holly is found only in the valley, where it grows in sandy bogs or along the creek banks.

Ilex caroliniana (Walt.) Trel. This southern species grows abundantly along the rocky ravines on the north slopes of Rich Mountain. It is also common, but of small size, in thickets at the top of the mountain.

Ilex decidua Walt. This deciduous species is common in thickets and woods, especially in the valley, but is also found in the mountain top. It sometimes becomes a small tree 5 or 6 meters tall.

CELASTRACEAE

Evonymus americanus L. This pretty little shrub is found occasionally in sandy bogs and on moist banks at the lower levels.

Evonymus atropurpureus Jacq. The Wahoo grows in thickets and open woods, being most abundant in the valley, but sometimes found at the mountain top.

STAPHYLACEAE

Staphylea trifolia L. The Staff-tree is common in the rich coves and on fertile slopes on the north side of the mountain.

ACERACEAE

Acer saccharum Marsh. The typical Sugar Maple is found occasionally in woods in the valley.

Acer saccharum var. *glaucum* Sarg. This is the common Sugar Maple of the Ozark region, and it grows abundantly and of large size, here in the valley and on the north slopes of the mountain.

Acer saccharinum L. The Silver Maple is rather rare, and found only along the margins of Big Creek.

Acer rubrum L. The Red Maple is a common tree of the valley and also frequent on rocky ledges and slopes on both sides of the mountains.

Acer rubrum var. *tridens* Wood. This variety is found in the valley and on ledges on the north mountain slopes.

Acer Negundo L. The Box Elder grows along the rocky margins of Big Creek, and is more rarely seen at higher levels.

HIPPOCASTANACEAE

Aesculus glabra var. *monticola* Sarg. This recently described Buckeye was found here only at the higher levels on the north side of Rich Mountain, and on the tableland at the summit. It is a slender branching shrub, from 0.5 to 1.5 meters tall, and often grows gregariously. It is very conspicuous in bloom on account of the large size of the flower spike in proportion to the whole plant. Its small fruit, low shrubby habit and peculiar foliage make it very distinct from all other related forms.

TILIACEAE

Tilia floridana Small. This fine southern Linden grows in sandy woods in the valley, and more abundantly on the north slopes of the mountain. In the latter situation it often becomes a tree 20 to 25 meters tall, and with a trunk diameter of a meter or more. It is also rarely found on top of the mountain, where it is of small size.

Tilia floridana var. *hypoleuca* Sarg. This form, with leaves pale or silvery beneath, from a white powdery coating, is frequent on the mountain side.

RHAMNACEAE

Rhamnus caroliniana Walt. This rather attractive little tree, known as Indian Cherry, is found sparingly in thickets along the creek.

Ceanothus americanus L. Grows in rocky ground in the valley and in open woods on the south slopes of the mountains. Not very abundant.

Ceanothus ovatus Desf. This species is apparently rather rare. It grows in similar situations to the last.

Berchemia scandens (Hill) Trel. This stout woody twiner is very common in thickets in the valley, and sometimes also grows in glades on the mountain sides and on the summit. It is popularly called Supplejack in some sections, but in the Southwest it is usually known as Rattan vine.

VITACEAE

Vitis rotundifolia Michx. The Muscadine is very common in thickets in the valley and along rocky creek banks. It is also sometimes found at higher levels. It usually spreads over low bushes or climbs on small trees, but never to a height of more than a few meters. The fruit is large and sweet, and is quite agreeable when ripe, in late autumn.

Vitis cinerea Engelm. This winter grape is found in the valley, growing in thickets along the creek, and also in open situations on the north side of the mountain.

Vitis cordifolia Michx. Occasionally found in the valley, where it is a high climber in trees, and more abundantly about the margins of rock slides, on the north slopes of the mountain. In the latter situations it is usually prostrate upon the rocks.

Vitis Linsecomii var. *glauca* Munson. This Southwestern species grows on rocky banks and in dry open woods on the mountain slopes. It can easily be recognized by its large firm leaves, purple-glaucous branchlets and depressed-globose berries, about a centimeter in diameter.

Parthenocissus quinquefolia var. *hirsuta* Planch. This pubescent form of the Virginia Creeper is frequent in the valley and occasionally found at higher levels. It is a stout climber on trees and sometimes on rocky bluffs.

THYMELAEACEAE

Dirca palustris L. This curious northern shrub, commonly known as Leatherwood, from its tough supple branches, was found along a little north-facing bluff of Big Creek.

GUTTIFERAE

Ascyrum stans Michx. This slender shrub is found rarely in sandy boggy ground and on moist banks in the valley.

Ascyrum hypericoides L. The little St. Andrew's-cross grows abundantly in dry rocky ground, especially on the south slopes.

Hypericum prolificum L. This tall shrubby species of St. John's-wort is quite common in places along the rocky margins of Big Creek, and is also abundant in open ground on top of the mountains.

Hypericum oklahomense, sp. nov.¹

Stems erect or spreading, diffusely branched above, the young branchlets slightly ancipital, leaves narrowly lanceolate or obovate, principal ones 5 to 10 mm. wide, 4 to 6 cm. long, abruptly pointed at apex, gradually tapering into a petiole-like base, distinctly finely punctate on the upper surface, of firm texture, with revolute margins, often with conspicuous fascicles of small leaves at their bases; bracts of inflorescence ovate or short oblong, broad-based; capsules narrowly ovoid or subulate, 12 to 15 mm. long, including the beak, which is often fully half as long as the body, 2 to 3.5

¹ *Hypericum oklahomense, sp. nov.*

Frutex erectus, 0.5-2 m. altus, interdum minor, ramis subteretibus cinereo-brunneis ramulisque ancipitibus; folia ramulorum anguste obovata vel lanceolata, abrupte acuta, basin versus sensim attenuata, superne punctata, margine involuta, 4-6 cm. longa, 5-10 mm. lata, saepe foliis fasciculatis multo minoribus in axillis; cyma terminalis composite dichotoma, subfoliosa, sparsiflora; capsula anguste ovoidea vel cylindrica, 5-locularis et manifeste 5-lobata, rostro incluso 12-15 mm. longa, 2-3.5 mm. lata, in rostrum longum attenuata; flores ignoti.

mm. thick, 5-celled and deeply 5-lobed, with sharp ridges and sutures, rarely 4-celled or less; inflorescence scattered at the ends of the branches; flowers not seen.

A shrub often less than 5 decimeters in height on dry rocky slopes, but in the protection of rocky ledges becoming nearly or quite 2 meters tall, with thin, freely exfoliating brownish-gray bark. This species appears to be most closely related to *Hypericum lobocarpum* Gattinger, of central Tennessee, but differs from it markedly in its firmer, narrower leaves, with more conspicuous fascicles of smaller ones in their axils, in its more scattered inflorescence and in the more slender sharply lobed capsules. The habitat also is quite different, *Hypericum lobocarpum* growing in dense swamps, according to the description. In appearance our plant more closely resembles *Hypericum densiflorum* Pursh.

CACTACEAE

Opuntia humifusa Raf. This low growing species of Prickly Pear is found locally in rocky glades on the slopes and top of the mountain.

NYSSACEAE

Nyssa sylvatica Marsh. The Black Gum is an abundant forest tree both in the valley and on the slopes and tops of the mountains. It attains its largest size on the north side of Rich Mountain, where there are many fine specimens.

ARALIACEAE

Aralia spinosa L. This small spiny tree grows in the coves and on rich slopes on the north side of the mountain. It is not common.

CORNACEAE

Cornus florida L. The Flowering Dogwood is a common small tree in the valley and on top of the mountains. It is found also in open woods on the mountain sides.

Cornus obliqua Raf. This western form of the Silky Dogwood or Kinnikinnik is very common along the margins and in the rocky bed of Big Creek and its tributaries in the valley. It is also found along the ravines and mountain torrents on the north side of Rich Mountain.

ERICACEAE

Rhododendron roseum Rehd. This beautiful Azalea, known in this vicinity and generally in the Southwest as wild Honeysuckle, is found in the valley and on the rocky slopes of Rich Mountain, where it is often very abundant.

Rhododendron oblongifolium (Small) Millais. Found only along the rocky banks of Big Creek and in moist rocky ground in the valley. It

blooms nearly a month later than the last species, and after the leaves are nearly grown. The flowers are pale pink in the bud, but soon fade to white, and are much smaller than in *R. roseum*.

Vaccinium arboreum Marsh. The Tree Huckleberry, so-called, is usually only a shrub in size here. It is abundant in the more open rocky parts of the valley and on top of the mountains, but is most common on dry rocky slopes and in glades on the south slopes, where plants less than half a meter in height were noted in fruit.

Vaccinium arboreum var. *glaucescens* (Greene) Sarg. The form with leaves pale and glaucous beneath is found with the type, but is less abundant.

Vaccinium stamineum L. This shrub, which grows to a height of from five decimeters to a meter, is very common in rocky ground, especially on the south slopes of Blackfork Mountain. It is also sometimes found in the valley and on top of the mountains.

Vaccinium vacillans var. *crinitum* Fernald. This is the common low Huckleberry of the Ozark region, and is one of the most abundant shrubs in rocky ground in the valley, on the south slopes and on the mountain tops. In the glades and rocky openings, where it covers many acres, it seldom exceeds 3 or 4 decimeters in height. The fruit is abundant and is often gathered by the country people. The name Blueberry, by which it is known in the Eastern States, is not recognized here.

Xolisma ligustrina (L.) Britton. This shrub is confined to wet rocky and sandy places in the valley, in close proximity to the streams.

SAPOTACEAE

Bumelia lanuginosa (Michx.) Pers. This small southwestern tree is not rare in open rocky ground in the valley and on top of the mountains. It also occurs in glades and on dry rocky slopes on the south side of the mountains. In the Southwest it is generally known as Gum-elastic, and in this section it is sometimes called Chittim-wood.

EBENACEAE

Diospyros virginiana L. The Persimmon is not uncommon in rocky ground in the valley and on the tableland at the top of the mountains.

Diospyros virginiana var. *platycarpa* Sarg. This variety, with its larger, earlier ripening fruit and pubescent leaves, is commoner than the typical form here, as throughout most of the Ozark region.

STYRACEAE

Halesia monticola var. *vestita* Sarg. A few small specimens of the Silverbell-tree were seen in the valley along the rocky creek banks, but it is abundant far up on the north slopes of Rich Mountain and in the rich coves.

OLEACEAE

Fraxinus americana L. The White Ash is rather abundant in the valley and on the north slopes of the mountains. In the latter situation it attains its largest size. It probably also occurs less frequently at all levels.

Chionanthus virginica L. This attractive shrub or small tree, known throughout this region locally as Old Man's Beard, from its abundant fringe-like white flowers appearing in early spring, is common in the rocky valley, and is sometimes also found on top of Rich Mountain.

VERBENACEAE

Callicarpa americana L. This shrub, sometimes called French Mulberry, grows in the valley, and is usually found in rocky ground along the margins of the creek. It is very conspicuous and ornamental in the autumn on account of its large axillary clusters of purplish-red fruit.

RUBIACEAE

Cephalanthus occidentalis L. The Button-bush, or as it is called in this section, the Button Willow, is found rarely along the margins of Big Creek.

CAPRIFOLIACEAE

Viburnum rufidulum Raf. This southern species of Black Haw grows rather sparingly in thickets and open woods in the valley and on top of the mountains. It sometimes becomes a small tree 5 or 6 meters in height.

Symphoricarpos orbiculatus Moench. This little shrub, known throughout this section as Buck-brush, is found in thickets and open rocky ground in the valley and on the mountain tops, but it is not common.

Since the area we are considering embraces only a single mountain valley, a few miles in length, and its enclosing ridges, the flora is naturally not a representative one for the entire sub-region, but only of certain phases of it. The most noticeable deficiencies in the list of trees and shrubs given above are the distinctly lowland and aquatic species, such as the Bald Cypress, Swamp Hickory, Water Oak, Bur Oak, Overcup Oak, Planer-tree, Cedar Elm (*Ulmus crassifolia*), Swamp Honey-locust, Pecan, Small Cain, Green Haw, (*Crataegus viridis*), White-wood (*Forestiera acuminata*) and Green Ash, all of which are abundant in the alluvial flood plains and swamps of the Arkansas River, fifty or sixty miles to the north, and most of them found much nearer, along small streams, including the Ouachita, and branches of the Poteau and Little River, all having their sources in these highlands. To anyone familiar with the flora of the more typical portions of the Ozark region, and especially the plateau section, the comparative paucity of the prairie flora in the glades and openings, or at least the absence of the peculiar isolated relic colonies and species so abundant northward, will be apparent. This is the more obvious on

account of the proximity of this area to the western prairies and closer geographical connection with the Southwest.

These deficiencies are, however, more than compensated by the presence here of many northern and eastern species. And it is to this element that the flora owes its peculiar interest. Amongst this class the following species may be mentioned:

<i>Magnolia acuminata</i>	<i>Robinia Pseudoacacia</i>
<i>Magnolia tripetala</i>	<i>Lonicera flava</i>
<i>Ribes Cynosbati</i>	<i>Dirca palustris</i>
<i>Philadelphus pubescens</i>	<i>Rhododendron roseum</i>
<i>Amorpha glabra</i>	<i>Halesia monticola</i> var. <i>vestita</i>

and of less significance such widely distributed species as *Quercus borealis* var. *maxima*, *Menispermum canadense*, *Hydrangea arborescens* and *Staphylea trifoliata*, all of which are near the southwestern limits of their range here. This list of trees and shrubs, although not a very long one, nevertheless, constitutes about ten per cent of the total, and if to them were added the herbaceous species, which are perhaps relatively more numerous, it could be made much more impressive. Most of these plants are not unknown northward in the Boston Mountains and some of them even in the deep valleys and canyons along the southern margin of the Ozark plateau, but they occur there only in a few peculiar and isolated spots, and these become rarer and more widely separated as we advance northward.

Magnolia acuminata is found along the margins of the old Mississippi Embayment, in southeastern Missouri and southern Illinois. It also turns up at a number of scattered localities in the Boston Mountains of northern Arkansas and we have records of it as far northwest as Eureka Springs, and along tributaries of the White River, in Barry County, Missouri. *Magnolia tripetala* is much rarer and more restricted in this region. Besides the station mentioned here, on the north side of Rich Mountain, I have seen it only in swampy lowlands in Hot Springs County, Arkansas. It has been reported a number of times from other parts of the Ozark region, and of course may rarely occur elsewhere, but most of these reports seem to have been based on wrong determinations of *Magnolia acuminata*, and in one instance at least I have seen leaves of *Asimina triloba* masquerading under this label. *Ribes Cynosbati* is also found in southeastern Missouri, and on high, north-facing bluffs of Current River in Shannon County, Missouri, and of James River in Stone County. In Arkansas, besides the locality described here, I have collected it on Magazine Mountain, in Logan County, where it is abundant on the north bluffs. *Philadelphus pubescens* has a more southern range, although growing in similar situations, usually in sandstone areas. The most northern stations at which I have seen it in the Ozark region are along Buffalo River, a tributary of White River, in Marion County, Arkansas, and at Jasper, Newton County, in the same state. *Amorpha glabra* appears to be one of the most restricted species in this region. The only other place at which I have seen it is on Magazine

Mountain, Arkansas. It may be expected to occur on some of the other higher mountains.

Robinia Pseudoacacia is much more abundant and widely distributed. It was commonly planted as an ornamental and shade tree about dwellings in the early history of the western lands settled by people from its center of distribution, and since it, like them, was of hardy and prolific stock, it took readily to the country and became widely naturalized. It has been said that the early Kentucky pioneer, when he started to seek a new home in the west, filled one pocket with buck shot and the other with seeds of the Black Locust; and wherever he settled it soon appeared. As to the other commodity, it may, like the dragon teeth of the fable, have gone out as allies to the hunters and woodsmen, aiding them to conquer the country which their descendants still dominate. However, to get back to our subject, this tree grows so abundantly on these mountains, in situations so remote from settlements, and where the flora is so uncontaminated, that there can be no doubt of its being indigenous here, and over a large part of the southern Ozark region.

Lonicera flava is also found rather frequently in the rougher parts of the Ozarks. But it evidently belongs in this association, ranging, as it does, from the mountains of North Carolina, through Tennessee and Kentucky. *Dirca palustris* is the most northern in its general distribution of any of the woody species found here. It grows from New Brunswick to Virginia, and through the Central States, although generally rare west of the Mississippi River. It is known in southeastern Missouri, and at a few isolated stations as far west as the James River in Stone County. Near Eureka Springs, in northwestern Arkansas, it is sufficiently abundant to have given the name Leatherwood Creek to a small stream. And it has been found some distance west of the Rich Mountain station, near Muskogee, Oklahoma. *Rhododendron roseum* has a similar range eastward, but has been found in Missouri only in the St. Francois Mountain section of the southeastern part of the state. It also occurs at one or two localities in southwestern Illinois.

Halesia monticola var. *vestita* is perhaps the most interesting, as it is the most restricted of the eastern woody species found in the Rich Mountain area. It is rather closely allied to *Halesia carolina*, which is found from Virginia and Florida to Kentucky and southern Illinois. The species found here has a similar though more restricted range, and is distinctly a tree of the mountains. It has previously been found at only one other locality west of the Mississippi River: along the Little Red River, in Cleburn County, Arkansas. It may be expected, however, to turn up in intervening stations.

It will be noted that the forest flora of this area is made up for the most part of species common in the Coastal plain to the south, as is the case over the entire Ozark region. The presence in these isolated and protected situations of a number of species having their center of distri-

bution along the Atlantic coast and in the southern Appalachians constitutes a notable extension westward of that flora and indicates its former wide migration westward and southward. The comparative paucity of species in the prairie openings and glades, or at least the absence of colonies of peculiar xerophytic plants of the western and southwestern plains, which constitutes so conspicuous a feature of the typical Ozark region to the north, would seem to indicate that this western plains flora, which under arid conditions unquestionably prevailed over much of the plateau section before the advance of the present forest, did not extend south of the Arkansas River, nor continuously at least, into the more rugged Boston Mountain area.

Any adequate discussion, however, of these questions would involve a more detailed study of the entire flora, and especially of the herbaceous plants of the glades and barrens, which is beyond our present purpose. It is proposed in a subsequent paper to give an account of some other interesting localities in this part of the region, and to see what light they throw on the history of the Ozark forests.

FORSYTHIA VIRIDISSIMA VAR. KOREANA

ALFRED REHDER

***Forsythia viridissima* var. *koreana*, var. nov.**

Forsythia suspensa Palibin in Act. Hort. Petrop. xviii. 155 (Fl. Kor. ii. 9) (1900), quoad specimina citata.—Nakai in Jour. Coll. Sci. Tokyo, xxxi. 89 (Fl. Kor. ii.) (1911), quoad specimina citata.—Non Vahl.

Forsythia viridissima Nakai in Jour. Coll. Sci. Tokyo, xxxi. 89 (Fl. Kor. ii.) (1911), quoad specimina citata; Fl. Sylv. Kor. x. 19, t. 2 (1921), excl. autor. plurimis citatis.—Non Lindley.

Frutex ramis patentibus arcuato-dependentibus; medulla continue lamellata sine diaphragmatibus. Folia indivisa, rarissime in turionibus vegetis trisecta, ovato-lanceolata vel oblongo-lanceolata, 5-12 cm. longa et 1.6-4.5 cm. lata, acuminata, basi late cuneata vel sensim attenuata, basi excepta vel tantum supra medium serrata vel serrulata, interdum integra vel fere integra, glaberrima, rarissime subtus pilis paucissimis instructa (in no. 10740 *Wilsonii*). Flores solitarii; pedicelli initio recurvi vel penduli, sub anthesi patentés, apice excepto dense bracteati, sepala ovalia vel ovali-oblonga, tubo corollae manifeste breviora interdum dimidium tubum tantum æquantia; corolla 1.8-2.5 cm. longa. Fructus non visi, secundum cl. Nakai ovato-attenuata, 1.5-2 cm. longa et 7-10 mm. lata, verrucosa, valvis medio impressis.

KOREA. Prov. Keiki, near Keijyo "in Seoul frequens," *U. Faurie*, no. 201, May 1901; Poukhan-san, side of a spring, probably planted, *E. H. Wilson*, no. 10740, September 24, 1918. Prov. South Heian, Chinnampo, *J. G. Jack*, September 17, 1905. Prov. South

Keisho, Chirisan, common by roadsides and stream-sides, alt. 600-1845 m., *E. H. Wilson*, no. 9607, November 14, 1917.

CULTIVATED. Korea: Keiyjo, Chosen Hotel, *E. H. Wilson*, no. 11241 Jan. 6, 1919 (flowers forced in the house). Arnold Arboretum: December 24, 1919 (seedlings), October 14, 1920 and (forced flowers) February 12, 1924 (plants raised from seed received from the Forest Department of Korea in 1919); April and September 1917 (plants received from Yokohama Nursery Company in 1915 as *Forsythia spec.* from Korea).

From typical *F. viridissima* Lindley of which there are specimens from Kiangsu, Chekiang and Fokien in this herbarium besides those from cultivated plants, the variety differs chiefly in the more spreadnig habit, larger and brighter colored flowers, longer and narrower sepals and in the more closely and finely serrate generally ovate-oblong or ovate lanceolate leaves, broadest about or below the middle and often broad-cuneate at the base. In typical *F. viridissima* the leaves are generally narrow and of an oblong-obovate or oblanceolate type, being broadest above or about the middle and narrow-cuneate at base, the serration is coarser, usually confined to the part above the middle and the leaves are more often entire, while on leaves of the more vigorous shoots of the variety the serration, which is coarser but with ascending mostly rounded teeth not flaring as in the type, extends to near the base; on very vigorous shoots occasionally, though apparently very rarely, trifid leaves are produced which I have never seen in typical *F. viridissima*.

From the hybrid *F. intermedia* Zabel (*F. suspensa* × *viridissima*) to which the variety bears some resemblance in habit and in the shape of its leaves, it is easily distinguished by the continuous lamellate pith, interrupted in the hybrid by solid diaphragms at the nodes and partly wanting in the internodes particularly of vigorous branches; in *F. suspensa* the internodes are quite hollow and the pith reduced to diaphragms at the nodes. The hybrid seems to occur also in Korean gardens, for there is a specimen before me collected by J. G. Jack in Seoul, September 22, 1905, from a cultivated plant, and a specimen collected by Dr. R. G. Mills, also at Seoul, on April 16, 1914, which both are referable to the hybrid, also specimens collected by *E. H. Wilson* (no. 6368) in the Tokyo Botanic Garden, on April 5 and July 12, 1914, from plants named *Forsythia viridissima* from Korea, belong here and so did part of the cuttings from these plants sent in 1915 by the Yokohama Nursery Company as *Forsythia spec.* from Korea, while at least one of these plants was the true *F. viridissima* var. *koreana*. As an ornamental plant the variety is to be preferred to the typical form, as it is of better, less stiff habit and has more brightly colored flowers and possibly is hardier.